

What is claimed is:

1. A method for producing nanocomposites, comprising:
providing a mixture of polymer and nanotubes;
shear mixing the mixture in an extruder to disperse the nanotubes within the polymer;
extruding the mixture from the extruder; and
drawing the mixture prior to solidification of the mixture.
2. The method of claim 1, wherein the extruder is a micro-scale extruder having conical co-rotating screws.
3. The method of claim 2, wherein the extruder includes a backflow channel that allows re-circulation of the mixture through a barrel of the extruder.
4. The method of claim 1, wherein extruding the mixture comprises:
extruding the mixture through a die.
5. The method of claim 4, wherein the die is rectangular and extruding through a rectangular die forms a film from the mixture.
6. The method of claim 5, comprising:
passing the film over a chill roller.
7. The method of claim 1, wherein providing a mixture of polymer and nanotubes comprises:
dispersing the nanotubes in a solvent; and
sonicating the resulting mixture.
8. The method of claim 1, wherein providing a mixture of polymer and nanotubes comprises:
dissolving a polymer in the solvent; and
drying to remove the solvent.

9. The method of claim 8, comprising:
melting the mixture prior to extrusion.
10. The method of claim 1, wherein drawing the mixture is performed at a draw ratio of about 5.
11. The method of claim 1, wherein the polymer is selected from the group consisting of: thermoplastic polymers and thermoset materials.
12. The method of claim 1, wherein the nanotubes are carbon nanotubes.
13. The method of claim 1, comprising:
recirculating the mixture through the extruder through a backflow path.
14. The method of claim 1, comprising:
controlling the viscosity of the mixture by controlling a temperature of the extruder;
15. A film produced from the nanocomposite of claim 1.
16. A nanocomposite, comprising: a plurality of nanotubes dispersed in a polymer matrix, wherein the nanotubes are mechanically aligned in a principal direction to a standard deviation from the principal direction of less than $\pm 15^\circ$.
17. The nanocomposite of claim 16, wherein the polymer is selected from the group consisting of: thermoplastic polymers and thermoset materials.
18. The nanocomposite of claim 16, wherein the nanocomposite is a continuous ribbon.
19. A method for producing nanocomposites, comprising:

providing a mixture of polymer and nanotubes, wherein the nanotubes are selected according to their diameters;

shear mixing the mixture to disperse the nanotubes within the polymer;

extruding the mixture from the extruder; and

drawing the mixture prior to solidification of the mixture to form a nanocomposite, wherein the distribution of nanotube diameters is selected according to a desired stiffness of the nanocomposite.